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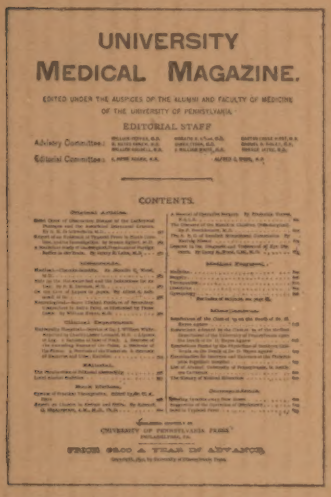

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NEURITIS AND MYELITIS AND THE FORMS OF PARALYSIS AND PSEUDO-PARALYSIS FOLLOWING LABOR.

By Charles K. Mills, M.D.,

Professor of Diseases of the Mind and Nervous System in the Philadelphia Polyclinic; Clinical Professor of Nervous Diseases in the Woman's Medical College of Pennsylvania; Lecturer on Mental and Nervous Diseases in the University of Pennsylvania; and Neurologist to the Philadelphia Hospital.

NEURITIS AND MYELITIS AND THE FORMS OF PARALYSIS AND PSEUDO-PARALYSIS FOLLOWING LABOR.[1]

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Neural and spinal affections of puerperal origin, although not entirely neglected, have received but little attention in the text-books and journals. Imbert-Gourbeyre[2] refers briefly to the occurrence of paralyses from trauma during labor in a monograph on "Puerperal Paralyses," giving several cases. One of these, from Rademacher, was an incomplete and painful paraplegia coming on at the end of a long and difficult labor, and cured in eight days, chiefly by friction. Another patient, 36 years old, during her third labor was paralyzed in both extremities, and recovered in a few months. Salvat is recited as reporting the case of a woman treated by him for vesico-vaginal fistula, with paraplegia produced by the long stay of the head of the fœtus in the inferior strait. Another patient, 32 years old, during her fourth labor, which was prolonged and the delivery by forceps, suffered great pain in the loins, accompanied by feebleness and swelling of the legs. The feebleness increased to paraplegia, and she had lancinating pains, paresthesia and cramps in the limbs. I have cited these cases in a paper on "Lesions of the Sacral and Lumbar Plexuses,"[3] in which I

[1] Read before the College of Physicians, Philadelphia, March 1, 1893.
[2] Imbert-Gourbeyre: Mém. de l'Acad. Imp. de Méd., tome xxv, 1861.
[3] Mills, Med. News, June 15, 1889.

have also reported two cases of sacral neuritis, kindly furnished me by Dr. Howard A. Kelly, of the Johns Hopkins Hospital. The first patient had passed through a difficult instrumental confinement some twelve years before coming under observation. She visited many prominent gynecologists and underwent a number of operations, the last being the removal of two large tubes and ovaries. She was relieved of menstrual exacerbations, but still suffered great pain in the pelvis, for which she was receiving galvanism, massage and antilithic remedies. A careful examination showed that the uterus and its surroundings were perfectly free from disease. On making a careful rectal examination, however, outlining the sacro-sciatic ligament and pyriformis muscles, and carefully palpating the roots of the great sciatic nerve, upon touching one cord she gave a sudden scream, at the same time doubling up her leg and jerking her body in the bed. Here, directly over the roots of the left sciatic nerve—the left sacral plexus—was the only diseased area which could be detected in the pelvis. All subsequent treatment was directed to this condition. The second patient had constant pelvic pain, which she described as soreness, located at the "back of the womb." She had been for several years, since the birth of her last child, under the care of gynecologists, who had not been able to give her any relief whatever. It was found by exploration that the only point of tenderness in the pelvis was at the roots of the sciatic nerve, and here she at once located all her pain, when the doctor introduced his finger into the rectum and made pressure on the nerve trunks. The case was one of neuritis. As Dr. Kelly remarks in the communication sending notes of these cases, they teach the value of exploration of the pelvis outside of the uterus and its annexes.

Ramsbotham[1] speaks of paralysis of both legs of varying degree occasionally happening after labor; more frequently when the process has been tedious and painful, but sometimes when it has been of ordinary duration, or even of unusual rapidity. He is evidently referring to the same classes of cases of which we are treating in the present paper. "It is not attended with cerebral affection," he says, "but is dependent on pressure which the muscles and nerves have sustained during the passage of the child's head through the pelvis. There is pain and numbness, both within the cavity and around the hip, and an inability to move the limb with freedom. It generally disappears by degrees within a few days; at other times it continues beyond the period the patient commonly remains in bed, and compels her when she rises from it to use a stick or a crutch. Fomentations in

[1] Ramsbotham: The Principles and Practice of Obstetric Medicine and Surgery. Am. ed., 1865.

the first instance, and afterward stimulating embrocations, a douche or shower bath, tonic medicines and gentle movement of the limb, will offer us the best chances of success. Hemiplegia, indeed, may appear after delivery as well as at other times ; but there will then be particular symptoms, independent of those connected with the local affection, which are too well known to require mention from us here."

Cazeaux and Tarnier,[1] in the American edition of their treatise, translated by Hess, under "Lesions of Innervation," direct attention to the various forms of paraplegia occurring during pregnancy or labor, most of which they attribute to reflex causes. Lloyd[2] considers some aspects of the subject in a contribution to Hirst's "American System of Obstetrics."

Winckel[3] introduces a brief chapter on the "Neuralgias and Paralyses of the Lower Limbs," with a paragraph which is comprehensive in its presentation of the etiology of these affections: "The puerperal neuroses of the lower limbs are located chiefly in the nerve trunks, more rarely in the nerve centres, and generally owe their development to parturition. Injurious pressure is effected by a large, hard, child's head, unfavorable in presentation in a small pelvis. Vigorous compression may result in complete interruption of conduction at the compressed spot. This occurs in instrumental aid during labor, inasmuch as the rim of the blades of the forceps may produce severe contusion of the sacral plexus on forced closure as well as during extraction. The thick nerves are also compressed not infrequently by a pelvic exudation, or small extravasations from the neighboring parts extend to the sheathes of the nerves, or hyperemia or edema of the neurilemma appear spontaneously. We have already mentioned that parametritis may give rise to such neuralgias. The location of the affection is in the external and middle cutaneous, obturator or sciatic nerves. The two latter nerves are especially apt to suffer during labor. Even the slight pelvic exudations, for example, one resulting from phlebitis, may make a nerve trunk incapable of conduction without compressing the entire trunk. (Leyden.) Injuries of the vagina, with subsequent severe cicatricial contraction, may also exercise traction and pressure on individual nerve trunks of the pelvis minor, and hyperesthesia and motor disturbances may thus be produced."

Brief references to this subject are also to be found in some of the neurological text-books, but it is not in these treated of systematically.

To Dr. Anna M. Fullerton, of the Woman's Hospital of Philadel-

[1] Cazeaux and Tarnier: Theory and Practice of Obstetrics. 8th Am. ed., edited and revised by R. J. Hess, M.D., 1887.

[2] Lloyd: Hirst's System of Obstetrics by American Authors, Vol. II.

[3] Winckel: A Text-Book of Obstetrics. Translated by J. Clifton Edgar, A.M., M.D., 1890.

phia, who, in her large obstetrical experience, has seen a number of instances of paralysis and pseudo-paralysis during the puerperium, I am indebted for the notes of some cases which will be given later. In a letter accompanying these notes she says that partial paralysis is in general short-lived, being limited generally to two or three days. She has seen paralysis of the rectum and sphincter from long-continued pressure of the head upon the floor of the pelvis, which sometimes persisted for a week or ten days, and which was only overcome by faradism and time; also vesical paralysis, which has sometimes lasted up to the sixth, seventh, or twelfth day after delivery. According to Dr. Fullerton, cases of contracted pelvis, which, because of a narrow inlet, have resisted the engagement or descent of the head, and cases in which for any cause there has been impaction of the fetal head, have been those most commonly resulting in paralysis.

The following are her notes of one of these somewhat serious but comparatively short-lived cases. Probably the case was one of pressure neuritis:

"M. M., married, a dwarf, aged 25 years; pubis generally contracted. The patient came to the Woman's Hospital maternity September, 1892, for her second confinement. The first stage of labor was very slow; descent of the fetal head very slow, with impaction in the pelvis before rotation; presentation, vertex, second posterior variety. There was threatened asphyxia of the child with exhaustion of the mother, which led to forceps delivery. The extraction was easy, and no laceration of the soft parts occurred. She complained, the night following delivery, of great pain in the right groin and entire right limb, and was unable to move the limb. Pressure on the anterior crural and obturator nerves caused her to cry out with pain. Flaxseed poultices were applied over the groin; the limb was elevated and bandaged with flannel. These symptoms lasted about ten days, and then entirely disappeared. She was out of bed by the third week, and able to return to her home the fourth week."

The most valable recent paper on puerperal paralysis of peripheral origin is that of Hünermann,[1] assistant in the clinic of Gusserow, at Berlin, on "Paralysis in the Region of the Sciatic Nerve following Labor." On examination of this paper, which I have obtained quite recently, I find that Hünermann has reasoned with reference to the production of the most common type of these palsies in much the same manner as I had already presented the subject in the arena at the Philadelphia Hospital, and to my ward classes. He carefully traverses the literature of the subject, and his paper can be consulted with advantage for French and German references. Among the writers to

[1] Hünermann, Archiv. für Gynäkologie, Berlin, 1892, Vol. XLII, Part 3.

whom he refers are von Renz, Koeppen, von Leyden, Kast, Möbius, von Basedow, Gerber, Breisky, Litzmann, Kehrer, Dorion, Bianchi, Lefebre, Brivois, Guinon and Parmentier, and Handford, to some of whom I shall have occasion to allude.

The affections to which attention will be especially directed in the present paper can be conveniently discussed under five heads:

(1) Traumatic paralysis of the peroneal type, usually associated with severe neuritis.

(2) Sacral and sacro-distal neuritis, sometimes accompanied by a pseudo-paralysis, and often maintained or aggravated by disease and displacements of the pelvic organs and tissues.

(3) Puerperal neuritis, local or multiple, and due to septic or other infection.

(4) The neuritis, paralyses, and pseudo-paralyses of phlebitis, and phlegmasia alba dolens, which are often septic, but have special features.

(5) Puerperal myelitis occurring under the same conditions as the forms of septic and infectious neuritis.

Brief references will also be made to forms of hysterical and reflex paralysis which must be diagnosticated from the affection under consideration. Some cases illustrative of each of the classes mentioned will be presented, the first class, however, receiving the fullest discussion. The first three cases are interesting examples of this type of paralysis and neuritis.

Paralysis of the Peroneal Type and Associated Neuritis after Labor.

Case I—*Prolonged labor and forceps delivery; left peroneal paralysis, anesthesia, and neuritis; recovery from the neuritis and persistence of the paralysis; previous history of syphilis.*—The notes of this case were presented to the Philadelphia Neurological Society, and were published with the discussion.[1] I shall give them here somewhat condensed.

Mrs. W., aged 30 years, had been twice married, and believed that she had been infected with syphilis by her first husband in 1884. In 1889 she married again, and was in labor June 3, 1891. The labor was prolonged and painful; instruments and chloroform were used. On recovering from the anesthetic she felt a severe pain in the left hip, leg, and foot. The limb was paralyzed, and from this time she suffered with all the symptoms of a severe neuritis, which continued with little abatement for about three months, when it began to decrease. In October it had almost entirely disappeared, but the left leg was still in an extreme condition of motor paralysis.

[1] Journal of Nervous and Mental Diseases, February, 1892.

Five weeks before she was examined by me she was suddenly stricken, without unconciousness, with an attack of paresis in the left upper extremity, and some difficulty of speech, from which, however, she recovered. The attack was cerebral, and has no bearing upon the problems discussed in this paper, except in so far as syphilis was probably the predisposing cause of both conditions.

On examination, it was found that all the movements of the muscles below the knee supplied by the branches of the external popliteal or peroneal nerve were paralyzed and non-responsive to electric currents. The foot was swollen, purplish in color, and cold. No loss of sensation was found anywhere, but she still had great pain on pressure at the sciatic notch, and in such cords of the sacral plexus as could be reached by the rectum. The muscles above the knee, and also the gastrocnemius, soleus, and posterior tibial, were not affected. Knee-jerk and muscle-jerk were normal on both sides. Bladder and rectum were not involved.

In the discussion of this case,[1] Dr. Wharton Sinkler spoke of a case which had fallen under his care. The patient was a small woman, a primipara, and the labor was instrumental and very difficult. On recovering from the anesthetic she complained of severe pains in the legs, and the pain and hyperesthesia continued for several weeks. He saw the patient in consultation about six weeks after labor. There was then contraction of the knees, and the muscles were considerably atrophied. Extreme hyperesthesia was present, especially below the knee, but no special pain over the nerve trunks, no loss of reflexes, and no loss of response to the faradic current. The patient recovered entirely, and in two months was perfectly well. The neuritis was complete and equal in both legs.

In the same discussion, Dr. F. X. Dercum reported a case which he saw some months after labor. Great violence had been used. Paralysis and wasting were both present. The type of the paralysis was not specified in either of these cases.

Case II—*Left peroneal paralysis and anesthesia; neuritis after two weeks; recovery from the neuritis; persistence of some paralysis, but very great improvement.*—Mrs. H., aged 33 years, was confined May 23, 1892. She was in labor twenty-one hours, with severe, almost constant pain during the last ten hours. She was under the influence of chloroform for nearly an hour, and was delivered by forceps. After delivery she found that her left leg was paralyzed and anesthetic, requiring to be lifted for all purposes. During the third week pain began in the hip, and rapidly became more and more severe, extending down the legs to the toes. Soon the other leg was attacked with a similar but

[1] Ibid.

less severe pain. Sometimes the pain was darting and burning, and the left foot was extremely sensitive to handling. Some loss of power was present in the right leg. She continued to have great pain, and was only able to stand or walk with the aid of a cane, and with much suffering on making the effort. Her treatment consisted of partial rest, the use of anodynes with liniments externally, and the internal use of morphine, atropine, and occasionally the bromides. Hypodermic injections of morphine and atropine were necessary for some time; but the morphine had unpleasant constitutional effects upon her, causing nausea and dizziness, so that it could not be continued.

This patient was first examined by me early in September, 1892. Her left leg was extremely sensitive over both its anterior and posterior aspects, especially above the knee in the left popliteal space. On the right side similar hyperesthesia was present, but not nearly so marked. Lateral squeezing of the left foot caused considerable pain, which was absent in the right. Examination both by the rectum and vagina showed extreme sensitiveness of the nerves of the pelvis, particularly on the left side. Until a week or two before coming under observation, moving about and sitting down with a slight jar would cause pain, which, she said, "seemed to be in the bones on each side of the rectum." No paralysis was present in the right lower extremity. The movements of this leg were almost perfect, showing only a little weakness. Below the left knee she was totally paralyzed for the movements of dorsal flexion at the tarsus, and of extension of the phalanges of the great toe and of the other toes. Movements controlled by the posterior muscles of the leg below the knee were present.

Believing that she had suffered from a crushing of the lumbo-sacral cord and upper sacral nerves and a consequent neuritis, and that this neuritis was still present and active, although improved, she was placed in bed with sandbags to her limbs; and upon the use of hot douches, mercurial and atropine inunctions, salicin and other remedies internally, in accordance with a plan of treatment which will be discussed later. After the neuritis had largely subsided, galvanism, massage and Swedish movements were systematically employed. The patient returned to her home cured of her neuritis, and with only partial paralysis of her anterior tibial remaining. She is still treated at her home with galvanism.

Case III—*Probable neuritis before labor; prolonged labor and forceps delivery; neuritis and right peroneal paralysis; recovery from neuritis, but persistence of some paralysis.*—Mrs. R., aged 24 years, had been healthy before her marriage. For a week before her first child was born she suffered severe pelvic pain. Labor was prolonged, and she was delivered with instruments. Before delivery she complained

of severe pain, commencing at the hip and extending to the toes of the right foot; and just at the time of the birth of the child she felt a very sharp pain, commencing at the hip and extending downward to the toes of the right foot. After delivery the pain and tenderness spread through the entire limb, every movement and jar of the leg causing suffering. On the ninth day she attempted to get on her feet, but found that the right leg was nearly helpless, and the pain on movement was so great that she was forced to lie down. This condition continued for five weeks. She thought the pain had been most severe on the outside of the limb from the ankle to the hip. At the end of five weeks she was able to walk, but found that she had not the proper use of her foot. She was not aware of having had at any time loss of sensation.

She came as an out-patient of the Polyclinic Hospital, remaining for a few weeks, and then disappearing from the service. She was sent for, however, and examined by me again January 28, 1893. In the meantime she had had another child, October 15, 1892. The condition of her leg was practically the same as at her first appearance at the Polyclinic service, although the woman herself claims that she had had better use of her limb since her last confinement. While having the second child she experienced pain similar to that from which she suffered during the birth of the first child, but of less severity.

She has at present no sensory symptoms. The right leg below the knee is a little smaller by measurement than the left; circumference of the left calf is 13.5; of the right, 12 inches. The movements now completely paralyzed are those of the tibialis anticus and peroneus tertius muscles. Dorsal flexion of the great toe and of the other toes can be performed, but flexion at the tarsus cannot. The extensor longus digitorum and extensor proprius pollicis muscles are, therefore, at present not paralyzed. Faradic and galvanic contractility are abolished in the anterior tibial and peroneus tertius—in fact, these muscles have largely disappeared.

A summary of Hünermann's four cases will be of interest in connection with these reports:

His first case was a primipara, aged 36 years. Labor began January 22, 1892, in the morning. On the 23d she had severe pain and convulsive movements of the right leg. Forceps delivery under an anesthetic was unsuccessfully attempted, when she was transferred to Berlin, a few miles distant, arriving January 24th, at the Charity Hospital, after three and a half days' labor. Details of her condition are given by Hünermann. Perforation and extraction were performed. The child had evidently been dead for some time, but the puerperium passed favorably. On the morning after confinement Hünermann dis-

covered complete paralysis of the right peroneal nerve. The woman complained of severe pains in the course of the sciatic, also of a feeling of numbness on the outer side of the left calf, and of tingling and creeping sensations in the toes. She could not dorsal-flex the right foot or extend the toes, nor sink the inner border of the foot; but she could with considerable force bend the foot downward; she could also flex the toes and execute all the movements of the knee and hip joint without difficulty. There was not the slightest disturbance of sensation. During the first three nights her sleep was completely interrupted by the pains in her legs. Wrapping the leg in cotton and bandaging it gave some relief. From the fourth day the patient was treated with the faradic current; but when on the thirteenth day she got up the muscles supplied by the peroneal were completely paralyzed. On the sixteenth day she was carefully examined and depression of the electrical excitability of the paralyzed muscles was established. She received a daily bath and electricity. The impairment in motility was still noticeable at the end of the third week, when the patient left the hospital. Her walk was still greatly affected.

Hünermann's second case was a primipara, aged 16 years, of frail, bony development, and childish in looks. Measurements were taken, which showed a contracted pelvis. The patient was at the end of her normal pregnancy. The child was in the first position on admission, January 22d. Details are given of the labor, which was tedious and halting, the pains becoming stronger until the 25th. The head had entered the pelvis with a remarkably low position of the fontanelle. Toward evening the patient felt pain and a feeling of numbness and tingling in the right calf downward from the knee; and she could not step on the right foot when she got up to pass water. She was delivered January 25, under an anesthetic, with the forceps, of a slightly asphyxiated girl, well developed, and showing a long line of pressure, which began about the right frontal eminence at the border of the hair, and reached diagonally to the left and backward. Hünermann particularly mentions this pressure line, which only disappeared on the tenth day, and was in his opinion not caused by the forceps, but by the linea innominata, which had resisted the progress of the child's head. On the first day of the puerperium the mother was found to have a complete paralysis of the peroneal nerve. As in the previous case, the phenomena were the same during the first few days, being without disturbance of sensibility, but with complete loss of function of the groups of muscles supplied by the peroneal nerve. She complained of painful twitching and of numbness in the right calf. On the evening of the first day fever set in, lasting until the thirteenth day. The perineum was ruptured; involution of the uterus was faulty, and the lochia of bad odor until

corrected by the antiseptic douche. On the seventh day and later she developed great pain in the right trochanter, and other symptoms of a descending neuritis. She suffered from headache and insomnia. She left her bed on the fifteenth day. On the twentieth day examination showed unequal pupils, not reacting to light, and not contracting on convergence; knee-jerk was missing on both sides. The ocular and knee phenomena are referred by the reporter to an attack of diphtheria which the girl had in her ninth year; or, perhaps, to congenital syphilis. She undoubtedly, however, had paralysis of the right peroneal nerve, which only developed in connection with or following the labor, although Hünermann says that it must be admitted that a previous disturbance of her central nervous system had predisposed her to an affection of the peripheral nerves. Several weeks after labor only a slight improvement in the peroneal paralysis had been accomplished.

The third case of Hünermann was a well-built woman with normal pelvis, aged 34 years, who had given birth to five living children without artificial aid. She was delivered in twelve hours, under chloroform, with forceps. The child was dead. Immediately after reaction from the anesthetic she felt strong, cramp-like pains in the left leg. She continued constantly to complain of pain in this leg, but Hünermann discovered a complete paralysis of the muscles supplied by the peroneal nerve of the left leg, while tactile sensibility was undisturbed. She had a hematoma in the left wall of the vagina, which disappeared in about two weeks. No pelvic exudate could be found. Paralysis with reactions of degeneration in the muscles supplied by the peroneal nerve continued. An examination made ten months after labor is given The left leg was then somewhat atrophied on the anterior and outer side. The sciatic was not especially sensitive at the great sciatic notch and trochanter major upon pressure; but distinct pain was present when the head of the tibia was pressed. Knee-jerk was more marked on the left than on the right. Sensibility was not disturbed. This case of paralysis Hünermann believes was due to the application of forceps, and as favorable to this view was the fact that the woman at once after the operation felt the pain in the left leg. A pressure of the roots of the sciatic nerve could easily take place; again, it was the lumbar roots which especially suffered, while the sacral nerves were very little affected. The case reminds him of one of the cases reported by Bernhart of left-sided peroneal paralysis after forceps delivery. In this case, also, forceps were applied in the high position, and the second position of the head.

The fourth case, M. R., aged 37 years, had gone through four hard confinements, all the children being born dead; she had had three

forceps deliveries. At the last confinement, after application and use of the forceps, she had a sudden tearing pain in the left side of the pelvis; at the same time she had strong jerking in the left leg. Since then she had been paralyzed in the same leg, and shortly after confinement she had wearing and jerking pains in this leg. She had no fever or parametritis after labor. Being disabled from walking, and the treatment at her home not being satisfactory, she came, six months after her confinement, to the medical clinic of Dr. Goldscheider, where Hünermann had the opportunity of examining her. He found an otherwise healthy woman who showed no signs of disease of the internal organs, with a marked paralysis in the region of the peroneal nerve, while the muscles of the tibial (internal popliteal) nerve were also affected. The paralyzed muscles were distinctly atrophied. Her walk, though awkward and clumsy, was quite possible without apparatus. Electrical examination showed complete reaction of degeneration in the left peroneal region; and in the region of the left internal popliteal a slight quantitative change to both currents was present.

I have thought it worth while to summarize these cases of Hünermann in connection with my own records, as the subject is one that has not been discussed in detail by writers; and in particular, the type of paralysis which so often results has not been pointed out, so far as I know, except by Hünermann.

In the cases described or referred to by Imbert-Gourbeyre, Ramsbotham, Winckel, Lloyd, Kelly, Fullerton, and others, no reference to any special form of paralysis has been made.

This question of the particular type of paralysis which results is one of the most interesting connected with the subject in hand. It will be recalled that my three cases were left with persistent paralysis in all, or some of the muscles supplied by the branches of the external popliteal or peroneal nerve. The cases of Hünermann were also of this type, and his paper is largely devoted to an exposition of the anatomical reasons for the occurrence of this particular form of paralysis. I had arrived at almost identical conclusions with those of Hünermann before I saw his paper, but I am indebted to him for interesting details and particular points in the anatomical explanation, of which I shall make use.

The sciatic nerve arises from the apex of a triangle formed by the sacral plexus at the distal border of the pyriformis muscle. The plexus lies on the anterior surface of this muscle in such a manner that the first sacral lies above the proximal, and the third under its distal edge, the second sacral being between the two on the anterior surface of the muscle. While the plexus thus lies with its sacral roots on a soft layer of muscle, the lumbo-sacral nerve (lumbo-sacral cord), rising from fibres given off in part from the fourth and wholly from

the fifth lumbar nerve, glides almost immediately upon a bony base over the sharp linea innominata. This lumbo sacral nerve is mainly the root for the peroneal or external popliteal nerve. The superior gluteal nerve arises from the posterior part of this lumbo-sacral cord; and, therefore, we would expect to and do find it affected in some of these cases of puerperal paralysis.

Lefebre, among others, has proved that the peroneal or external popliteal nerve is a continuation of the lumbo-sacral cord; and rare cases have been reported in which it could be traced as a separate nerve all the way from the pelvis.

A study of this kind shows how anatomico-physiological investigation and practical medicine sometimes reciprocate their services. One of the important problems in spinal and peripheral localization is the determination of the relationship of particular segments of the spinal cord to certain nerve movements, reflexes and areas of sensation. M. Allan Starr[1] has published a table of the localization of the segments of the spinal cord, which has been modified and added to by me in a paper on "Spinal Localization."[2] The results embodied in these tables were arrived at by physiological, clinical, clinico-pathological, anatomical and histological investigations. In the present study practical obstetrics assist us to a decision as to the segmental origin, root and exact course of one of the most important nerves of the lower extremities.

Below is given from this table that portion which relates to the localization of the representation of movements of the lower limb in the spinal cord from the fourth lumbar to the second sacral segment:

FOURTH LUMBAR SEGMENT:
MUSCLES.—Abductors of thigh.
Adductors of thigh.
Flexors of knee.
Tibialis anticus.
Peroneus longus.

FIFTH LUMBAR SEGMENT:
MUSCLES.—Outward rotators.
Flexors of knee.
Flexors of ankle.
Peronei.
Extensors of toes.

FIRST AND SECOND SACRAL SEGMENTS:
MUSCLES.—Flexors of ankle.
Extensors of ankle.
Intrinsic foot muscles.

[1] Starr: Amer. Journ. Neurol. and Psych., 1884, and Amer. Journ. Med. Sci., 1888.
[2] Mills: Therapeutic Gazette, May 15 and June 15, 1889.

The chief divisions of the peroneal are the anterior tibial and musculo-cutaneous nerves, the former supplying the tibialis anticus, extensor longus digitorum, peroneus tertius and extensor proprius pollicis muscles. One of the branches of the anterior tibial also supplies the extensor brevis digitorum; and from the musculo cutaneous nerve are given out fibres to the peroneus longus and brevis. Any or all of the subdivisions of the peroneal may be affected in these traumatic puerperal palsies, but the movements controlled by the anterior tibial are most likely to remain persistently paralyzed, as a brief reference to the movements effected by these muscles alone, or in groups, in connection with a study of the details of the cases, will serve to make clear. The tibialis anticus muscle elevates the inner front portion of the foot, flexing it at the ankle joint and adducting it. The extensor longus digitorum, commonly working with the extensor proprius pollicis, extends the toes and, continuing, helps to flex and abduct the foot. The peroneus tertius is really a part of the extensor longus digitorum, and works with the anterior tibial in the direct flexion of the tarsus upon the leg. The peroneus longus and the peroneus brevis, which are supplied by the musculo-cutaneous, evert and rotate the foot outward.

A study of these facts of the table shows that the movements paralyzed in these cases of puerperal traumatism are those of the muscles supplied by the peroneal or external popliteal nerve, and that these movements have their representation chiefly in the fourth and fifth lumbar, and the first sacral segments of the spinal cord, where the lumbo-sacral cord and first sacral nerve evidently arise.

It is a fair question whether the spinal cord does not become secondarily diseased by extension of the inflammation backward along the great nerve cords assaulted. The paralytic, trophic, and vasomotor phenomena presented by some of the cases are difficult to distinguish from the conditions due to a complete crushing of a large nerve root or cord.

While a complete crushing of the lumbo-sacral cord and of the upper sacral nerves would account for a long and persistent palsy of the muscles supplied by these nerves, it is not unlikely that the neuritis in some of these cases not only extended and diffused itself throughout the extremity, but has ascended and entered the cord, and attacked the ganglion cells of the cornua, giving us, in a word, a neuro-myelitis.

In connection with this point the method of the extension of the inflammation from one limb to the other is of interest. This occurs after a longer or shorter time; the two limbs are not coincidently affected with the inflammation. It is probable that the inflammation extends not in the pelvis nor by way of the cord proper, but rather by the cauda equina, spreading sidewise from one closely apposed nerve or nerve-sheath to another.

Although these peroneal palsies usually occur in cases of instrumental delivery, the traumatism which produces them is not commonly inflicted by the forceps. The labor is instrumental because, owing to a contracted pelvis, it is greatly prolonged. The injury to the nerve cords is usually inflicted by the skull of the child, although nerve injuries are doubtless sometimes inflicted by instruments. Hünermann speaks of this being the case sometimes when pendulum, side to side, and rotating movements are made. One practical point in the diagnosis of nerve injuries made by the forceps from those caused by the head of the child is that in the former the second and third, and even lower sacral nerves are most likely to be injured, and in the latter the lumbo-sacral cord and first sacral nerve. Cases have been reported in which, from instruments, the posterior calf muscles—those supplied by the internal popliteal—have been paralyzed instead of those supplied by the external popliteal or peroneal. In one case which has come to my knowledge, a sharp pain came on immediately after the application of the forceps, and the patient said that this pain was much greater than any endured during the prolonged labor. She was at the time partially under the influence of ether, but cried aloud with the pain in her leg when the forceps were applied. The pain, she said, was different from the ordinary labor pain, although in her case this was extreme. Afterward she had some neuritis, which continued for six weeks, and when she was up and walking about she was quite lame for at least two weeks. This was probably an instance in which some portion of a nerve has been pinched—one of the cords of the plexus, and probably the second or third.

From several points of view prophylaxis is of great importance in these traumatic cases. Certain obstetrical questions need to be more fully considered than can be done by one who, like myself, is not an obstetrician. The reports of the cases by Hünermann have a value not possessed by the records of my own cases, in that he gives certain important obstetrical details, such as the positions of the head and pelvic measurements. These measurements, according to him, in some of the cases showed a generally contracted pelvis. Certainly these cases emphasize the importance of taking pelvic measurements. Instrumental delivery should, if possible, be effected comparatively early; or even the propriety of resorting to perforation or Cæsarean section should sometimes be taken into consideration. The delay in using forceps, rather than the forceps, is sometimes responsible for the nerve crushing, neuritis, and paralysis.

According to Hünermann, these accidents should not occur in normal pelves, except in face and brow presentations. He quotes two

cases from Gerber, in one of which the presentation was of the face, the brow forward and to the right.

It is a striking fact that two sisters of one of my patients died in labor within two months of her own delivery. The three sisters may all have had generally contracted pelves. In the simple flat pelvis and the rachitic flat pelvis, according to Hünermann, if instruments are not used, paralysis is not likely to occur, the oblique diameters of the pelvis being rather above than below the average in these cases.

Sacral and Sacro-Distal Neuritis without True Paralysis, Although Sometimes Accompanied by Partial or by Pseudo-Paralysis.

During labor, especially when prolonged, and sometimes even during the last stages of pregnancy, as the result of friction and pressure, a lumbo sacral neuritis of varying intensity arises, and may continue for a longer or shorter time, according to the constitution of the patient, the state of the uterus and other pelvic organs, and the course which is pursued in the management of the patient. Some of the cases which are alluded to by Dr. Fullerton, as instances of short-lived partial paralysis, are doubtless of this class, as, for instance, the one of which brief notes have been given in the introductory portion of this paper. This woman suffered great pain in the groin and limb, and was unable to move the latter, and pressure on several nerve trunks caused much suffering. In three weeks, however, she was practically well, the pain and paresis having disappeared in ten days. Every general practitioner will have in mind some case of this character, which has recovered under rest, and which rest has been compelled by the patient's suffering as much as by the advice of the doctor; or has recovered without rest or treatment through the robust recuperative powers of the individual; but not a few patients of this class are practically neglected, all the conditions present not being fully recognized, and the treatment, as a rule, not being sufficiently painstaking and thorough.

Altogether similar in their symptomatology are some cases, which appear to have no immediate connection with the processes of pregnancy or labor, but are due to the irritation which is maintained by the nagging of an enlarged or displaced uterus, or by disease and enlargement of the ovaries and tubes, or by inflammatory processes in the pelvis, no matter how they may have originated. I wish, however, especially to direct attention to a set of cases which seem to date back to a particular labor, although they have evidently been aggravated and perhaps continued by conditions which may or may not be associated with the puerperium. I could give notes of many minor, although sufficiently troublesome, cases of this description, but I shall

content myself with presenting the details of one case in which the symptoms were severe and striking. This history will be presented without special comments, as the details speak clearly for themselves.

CASE IV—*Sacral neuritis; pseudo-paralysis; anemia and neurasthenia.*—W., aged 33 years, had never been very strong, and when a child had been subject to precordial and other neuralgic attacks. Her mother had been subject to headaches and neuralgic attacks, and her only sister had had chorea when a child. Menstruation started when she was 12 years old, and had always been free, lasting usually from five to seven days. She was almost continuously pale and anemic-looking. She had had three children. Six years before coming under observation, while carrying her first child, she began to suffer with pain from the heel to the hip of the left leg; this never entirely left her, and with each child she had become worse. After the birth of the third child, about one year before she was first seen, it became more severe, and she was compelled to use crutches for a month, chiefly because of the suffering it caused her in attempting to walk. At frequent intervals, also, she had exacerbations of pain in the left leg, and paroxysms of pain in the back, usually compelling her to go to bed. Her suffering was so great, and at times the limb was so helpless, that she could not move it.

Careful examination showed great sensitiveness, particularly over the sciatic distribution, although not confined to it. The right lower extremity was also sensitive to pressure and handling, but not nearly to so marked a degree. Examinations were made both by the rectum and the vagina, and revealed extreme sensitiveness over the left sciatic plexus, less marked on the right side. The uterus was found to be prolapsed, enlarged, and completely retroverted, with pelvic exudations and adhesions. The os was patulous, and slight cervical and perineal lacerations were present. The ovary and tube on the left side were tender and somewhat enlarged; the same conditions, but much less in degree, were present on the right. The uterus and surrounding tissues were all extremely sensitive. In brief, the nerves and the other organs and tissues in the pelvic cavity were in an inflammatory state, much more decided on the left. Treatment was instituted with the threefold purpose of improving the general health, of relieving the neuritis, and of restoring the uterus and its appendages as nearly as possible to a healthy state. She was placed in bed with sand bags to her limbs; mercurial inunction, with atropine, were used twice daily; strychnine, salicin and iron were given internally, with at times other tonics and nutrients and anti-neuritic remedies; hot douches were used to the limb twice daily, and she was placed upon a nourishing and digestible

diet. Phenacetin and sulphonal were occasionally used for pain and sleeplessness.

The gynecological treatment was carried out by Dr. M. I. Bassette. Douches of hot water with opium and glycerin were used nightly; every other day for a time vaginal tampons, medicated with belladonna and boro-glyceride, and later with a 10 per cent. solution of ichthyol, were introduced. Gradually the exudate diminished, and the uterus became smaller and movable, when it was replaced daily, and the patient was made to assume the knee-chest position twice a day. The sensitiveness, both internal and external, steadily improved, and the attacks of paroxysmal pain become less and less frequent.

After six weeks of treatment a consultation was held with Dr. B. F. Baer. The uterus was still enlarged, with a tendency to retro version, unless held in position with tampons. It was decided to curette with a view to decrease its size, and lessen the tendency to engorgement. After the operation the uterus was thoroughly washed out and injected with carbolic acid at intervals of a few days. She was also subsequently treated for three weeks with carbolic acid and iodine, at intervals of a few days. She was also given ergot and nux vomica, and under this treatment the uterus became smaller and less vascular, and remained in position longer without support.

After three months the patient returned home, the neuritis having disappeared, and the uterus and its appendages in such condition as to require only occasional treatment.

In all cases of this kind, and even in cases in which the symptoms are much less striking, careful examination should be made by the vagina and the rectum. The finger, guided by certain well-known landmarks, can reach some of the cords of the sacral plexus. Pressure upon, or even a gentle touch of the inflamed nerves will cause excruciating pain. Any nerve pressed or rolled on a hard substance like bone, will of course be a source of pain, but the suffering which is experienced in cases of true neuritis is of scarcely endurable character. With a little practice we become more and more skillful in reaching the nerves, and in distinguishing between the pain of inflammation and an ordinary hurt of the nerves.

The large nerve cords of the sacral plexus are not alone inflamed in these cases, but the inflammation may spread to the nerves distributed everywhere in the pelvis, and to the nervous plexus to the uterus, which, Rein[1] has shown, lies mainly in the cellular tissue surrounding the vagina, at the point where the hypogastric plexus

[1] Société de Biologie, quoted in American Journal of Obstetrics, vol. xvi, 1888.

anastomoses with the filaments of the sacro-uterine nerves. All the fibres which go to the uterus, either from the hypogastric plexus or from the sacral nerves, pass through this plexus. This accounts for the extreme sensitiveness of such patients, even to careful vaginal examination.

One mode in which the post-puerperal paralysis may develop is through inflammatory processes originating anywhere or anyhow in the pelvis. Hünermann refers to this cause and cites a few cases. Intra-pelvic exudation may be of such size as to cause pressure, or the exudate may involve the lumbo-sacral cord or sacral nerves. To such cases I have also called attention in my former paper on sacral and lumbar lesions. Hünermann refers to three cases reported by Von Leyden, of severe sacral neuralgia, all having high fever. In one of these cases an autopsy was had and showed peritonitis, pleuritis and numerous thrombotic veins in the pelvis, one of which ran close to the sciatic, and was bound to it by infiltrations. Microscopic examination showed both peri-neuritis and neuritis. Von Dorion has described a case with abscess in the left pelvis and peroneal paralysis after labor.

Puerperal Neuritis Due to Septic or Other Infection.

In a third class of cases, puerperal neuritis, isolated, diffused, or multiple, and probably infectious in origin, is present. A few writers have reported cases of multiple neuritis shortly after normal labor. Auto-infection has been suggested as the best explanation. Some of these cases occur during pregnancy, thus indicating their non-traumatic origin. In some the neuritis and consequent paralysis has been in part or chiefly in the upper extremities, as in cases reported by Möbius and Kast. The symptoms present need not be detailed: they are in brief those of neuritis, local, diffused or multiple; pain, hyperesthesia, paresthesia, paralysis or pseudo-paralysis; sometimes anesthesia; often changes of the reflexes; cramps and contractures, and occasional atrophies and reactions of degeneration. Usually these cases occur in the first, second or third weeks after labor, but they may follow immediately or at a later period than three weeks. Theoretically no good reason exists why, as the result of infection either from without, or perhaps from within, any form of puerperal neuritis may not occur, and it is of some practical importance to separate traumatic cases from those which have a septic or infectious etiology.

Möbius[1] has reported the case of a woman, aged 29 years, who, two days after arising from bed, and three weeks after the birth of her child, had a sense of painful cramp in the left calf, which kept her in

[1] Möbius: Münchener medicin. Wochenschr., 1892, No. 45, p. 799.

bed for three weeks, at the end of which time some enfeeblement of movement of the forearms manifested itself. A few days later there was complaint of pain in the scapular regions, which lasted for a week. Then, in the ninth week, peculiar sensations in the right forearm were perceived; and the act of writing could not be performed, because the thumb failed to firmly grasp the pen. The flexor longus pollicis was wasted and presented reactions of degeneration. Electrical treatment was followed by little improvement. In a second case a woman, 55 years old, complained of pain at the right elbow, which readily yielded to ordinary measures. Examination, however, disclosed the fact that atrophy of the ulnar and thenar muscles had been present for thirteen years, first showing itself shortly after labor. Motility was not materially impaired, and electric reactions were presented. Both cases were considered to be instances of neuritis of puerperal origin. Möbius[1] also records the case of a patient who had had perfectly normal labor; the puerperium was free from fever. She first complained of pain and paresthesia in the upper extremities, with diminution of motor power; two weeks later the same symptoms were present in the legs, no anesthesia, reflexes normal, as were also the responses of the muscles to mechanical irritation; the muscles were somewhat atrophied in the upper extremities, but not in the lower. Recovery occurred under treatment by iodide of potassium. Later she had a mild form of neurasthenia, but without any of the above symptoms of neuritis, except tenderness on pressure over the brachial plexus. Möbius considers the initial localization of the illness as characteristic, for in the later course all forms of neuritis may become general and give us the same picture.

Handford,[2] in a brief communication on the puerperium as a factor in the origin of multiple neuritis, has reported three interesting cases. Two of these bear out his diagnosis of multiple neuritis. In both, alcohol was a predisposing factor. As the notes of these cases are brief I will give them.

K. M., aged 43 years, married seven years, three children; has always been a stout, florid, healthy woman. Her husband kept a public house, but evidence of drinking habits in the patient could not be obtained. Three days after her confinement she lost power in the legs, and at the same time felt strange sensations like pins and needles in the arms. This was soon followed by paralysis. She had been able to walk about up to the date of her confinement. The general course and character of the paralysis was typical of an alcoholic multiple neuritis. There was loss of muscular sense, impaired cutaneous sensi-

[1] Referred to by Hünermann. Abstracted in Journal of Mental and Nervous Diseases, January, 1891, Vol. XVI, No. 1, p. 45.

[2] Handford, British Medical Journal, November 28, 1891, Vol. II, p. 1144.

bility, but greatly increased deep sensibility, great muscular wasting, loss of knee-jerks, and the presence of the reactions of degeneration in the muscles of the legs and arms. The condition of the eyes was normal. She was able to walk a little in six months, and in twelve months was comparatively well.

The second case was a stout, well-nourished woman, aged 34 years, also the wife of a public-house keeper. She suffered with complete paralysis of the extensors of the toes and the flexors of the ankle, with weakness of most of the other muscles of the leg, coming on immediately after confinement. The ankle-joints were habitually extended and the toes pointed. There was much hyperesthesia, but superficial and deep, and a little edematous swelling. No contraction could be elicited in the muscles below the knee by as strong a faradic current as the patient could bear. A voltaic current from twenty-six cells, registering thirty milliampères, caused much pain and some contraction of the rectus femoris, deficient in quantity and normal in quality. No response could be obtained from the muscles below the knee. Some weeks later considerable muscular wasting was present, extending as high as the right gluteal muscles. In six months she could walk without a stick, and eventually recovered, except that the affected muscles remained rather stiff.

In a system predisposed by the effects of previous disease or excesses, and reduced by the exhaustion, excitement and strain of labor, septic or other infection attacks the nerve centres or fibres, and as a result, according to the degree and extent of the onslaught, neuritis with or without palsy, or myelitis, or intracranial inflammations with convulsions, or psychical affections, or other brain symptoms, may occur.

A woman, recently a patient at the Polyclinic, a few days after labor, and after an effort to stop the flow of milk, was attacked for the first time with frontal headache, which has persisted with a few intervals of relief for twelve years, during which time she has passed through five other labors, losing two of the children in early infancy. This ache, probably initiated by a mild infectious neuritis, has never left her.

Recently, in the post-mortem room of the Philadelphia Hospital, I was present at an autopsy on a patient from the wards of Dr. E. P. Davis, this case illustrating the other extreme. This woman, three hours before she was brought to the hospital by the police patrol, had been delivered of a child without proper attention, and with wretched surroundings. She was suffering with hemorrhage until after admission to the hospital, and was in a state of acute mania. In addition, her limbs, particularly the upper ones, were extremely hyperesthetic.

Her head was drawn backward somewhat to one side, and active contractures were present in the upper limbs, and possibly also in the lower, but these were not closely examined. She had a scattered petechial eruption. She died about thirty-six hours after admission. The symptoms were such as to suggest cerebro-spinal meningitis. The autopsy showed clearly that no meningitis was present. Sections of the brain and cord showed them to be blanched and dry. Doubtless this was a case of profound toxemia, asssociated with anemia caused by the great loss of blood. The patient's blood was in the puerperal condition, the surroundings of her labor were depressing, and she was of the class of those who so often suffer from the ravages of alcoholism or syphilis.

Neuritis and Paresis Associated with Phlegmasia Alba Dolens.

Neuritis, and the partial paralyses of phlebitis, and phlegmasia alba dolens, can be conveniently discussed as a separate class, although perhaps they might be included under other heads given.

Patients suffering from phlegmasia alba dolens are, of course, more or less helpless and paretic during the progress of the affection; but, in addition, it sometimes leaves forms of paralysis and pseudo-paralysis. Doubtless a true neuritis is often present in phlegmasia, either as a result of the spread of inflammation by contiguity, or because of pressure and interference with the nerve trunks. A form of atheromatous neuritis is now recognized, and has been described by Gowers as a variety of the senile form of multiple neuritis; and it is held that in this disease the nerves of the limbs have been extensively damaged through the obliterating arteritis, necrotic inflammatory processes going on in the parts of the nerves supplied by the affected vessels, either arteries or veins. These processes may or may not result in occlusions, and are frequently accompanied by a true neuritis, which is the origin of most of the pain. In phlegmasia, likewise, a true neuritis may set up; and this may in part persist after other symptoms and conditions have subsided, or nerve degeneration may take place as the result of the neuritis, or of the pressure exercised on the nerves by the swollen and indurated tissues. Even the gangrene, in which phlegmasia sometimes terminates, has been regarded as in part at least neuro-trophic rather than altogether due to interference with the circulation. Finally, a patient suffering from phlegmasia may at the same time, or as a sequel of the affection, develop a septic, pyemic, or infectious myelitis of the transverse or some other variety, which will give rise to marked and, it may be, incurable paraplegia. Winckel quotes

Mauriceau, Boer, Casper and Gittermann as reporting a greater or less degree of paralysis of the affected limb as left over by phlegmasia. Dr. Anna M. Fullerton has furnished me with some notes of several cases of this character, patients who have been confined at their homes without proper antiseptic surroundings and attendants, and have come to the hospital for treatment. She believes that inflammatory and septic complications are responsible for this class of cases; in them she has found extensive lesions, often of the soft parts, due to injuries occurring during birth, which have left open surfaces for the absorption of the poison. The following are notes from cases furnished by Dr. Fullerton:

CASE V—*Pyemia, phlebitis, anesthesia and pseudo-paralysis.*—A. H., married, aged 27 years, pelvis generally contracted, was delivered of her second child six weeks before admission to the Woman's Hospital. The labor was said to have been easy. The condition of the patient during her pregnancy had been poor. The drainage of the house and the vicinity was poor, and she thought she had chronic malaria. She had suffered some time previous to her marriage with uterine trouble, and during her pregnancy had been under the constant care of physicians to ward off threatened abortion. Her second labor was followed by an attack of sepsis. When able to be moved she was brought to the hospital. Upon examination an abscess was found over the right sacro-sciatic foramen, and a bedsore on the buttock of the same side. A left crural phlebitis existed, with stiffness of the knee, and an edematous and anesthetic condition of the leg. The uterus was enlarged and tender, and found imbedded in a mass of pelvic exudate. She was placed upon supporting treatment. The limb was first treated by elevation and application of belladonna and iodine ointment. The pelvic condition was treated by douches and hot packs. The abscesses were evacuated and washed out with antiseptic solutions. Later the limb was treated with massage and electricity. She returned to her home much better six weeks after admission. She was able to walk, but the limb was still weak and continues so up to the present time, January, 1893. The pelvic exudate has been absorbed. The uterus is movable, but a left salpingitis exists with distention of the tube, for which laparotomy has been advised.

CASE VI—*Phlegmasia and neuritis.*—D. R., single, aged 22 years, was confined in the Woman's Homeopathic Hospital early in October, 1892, with her first child. Labor was said to have been long, but not instrumental, and was followed by phlegmasia dolens affecting both limbs, the left being first affected, and greatly swollen. She was admitted to the Woman's Hospital January 8, 1893, for severe pain in

the foot, affecting especially the great toe and the two next to it, and extending into the ball of the foot; some pain was in the entire limb, with imperfect use of it. She had enlarged inguinal, axillary and cervical glands; she was and still is pale and anemic, remaining under treatment, which has been supporting, with elevation and rest of the limb, and application of belladonna ointment. Considerable improvement has taken place in two weeks. Pelvic examination showed a laceration of the cervix, extending to the vault of the left side of the uterus, which is movable and larger than usual.

CASE VII—*Pyemia with anchylosis, atrophy and pseudo-paralysis.*—M. T., aged 27 years, married, entered the hospital October 30, 1891, threatened with premature labor at seven months. It was discovered that she had made attempts to induce labor for some time by means of vaginal injections. Her general condition on admission was very poor; she was pale, anemic and apparently half-starved, with albumin in the urine. Notwithstanding the efforts made to arrest the threatened miscarriage, labor occurred on November 5, being preceded by a chill and rise in temperature. After the delivery her condition remained fair up to about the eleventh day, when again there was a chill and rise in temperature. She had complained of some pain in the right limb since delivery. A synovitis of the right knee, with considerable swelling and complaint of pain and stiffness in the limb, developed. Later, suppuration of the knee occurred, necessitating evacuation and drainage. Other metastatic abscesses occurred. The knee became anchylosed; the muscles of the limb wasted greatly. After a long course of supporting treatment, with massage and electricity applied to the limb, she recovered so she was able to walk without pain, but with a slight limp. She was discharged March 21, 1892.

CASE VIII—*Pyemia with paralysis, atrophy and anesthesia.*—M. F., aged 26 years, married, flat pelvis, was confined to her home with her first child. The labor was long and difficult, requiring instrumental delivery. The child was still-born. There was extensive lacerations of the soft parts. The patient was kept to her bed for sixteen weeks with septic fever. The physician who attended her spoke of the position as having been a posterior variety of the occiput. The patient was admitted to the Woman's Hospital February 1, 1890, with the left limb paralyzed, wasting of the muscles and some loss of sensation. Pelvic examination showed the existence of bilateral laceration of the cervix uteri to the vaginal vault. The pelvis was filled with an inflammatory exudate, fixing the uterus, which was large and tender. She was placed under treatment, with douches and hot packs for the pelvic condition, and daily faradization of the paralyzed limb, with general restorative treatment. She was discharged March 16, greatly improved,

but with locomotion still imperfect. She returned to the hospital September 22, 1891, for second delivery, although she had been advised, in a similar condition, to have premature labor induced. The os was found to be fully dilated; the fetal head showed no attempt at fixation Version was performed, and delivery was effected without any injury to the mother. The fetus was born in the second stage of asphyxia, and could not be resuscitated. The puerperium was perfectly normal. The patient had entirely recovered from her paralysis.

Puerperal Myelitis Due to Septic or other Infection.

No reason exists why myelitis, or even meningitis or cerebritis, as well as neuritis, may not occur as a result of infection during the puerperium. My own notes only include one case of myelitis. In this case the occurrence of two attacks at intervals of several years, and evidently myelitic in character, is interesting in connection not only with the history of alcoholism, but also with the view that disseminated myelitic foci, in the great majority of cases, are septic and infectious. The following are the notes of this case:

Case IX — *Transverse myelitis with persistent paraplegia; four years later, bulbar myelitis; history of alcoholism.*—H. L., aged 41 years, white, a patient in the nervous wards of the Philadelphia Hospital, was married when twenty-two years of age and had seven children. One of her sisters died of phthisis. She denied specific history, but admitted using alcohol to excess. Her menstruation had been painful up to her last labor, and since then had not occurred. At the time of, or just after her first labor, nearly five years before the time she was studied, she became paralyzed in both legs, but suffered no pain. From this time, also, she was unable to see distinctly as before, and she thinks that her eyeballs began to be a little more prominent. Her condition remained without much change for nearly four years. In a short time she was able to sit up, but never, since the attack, has she been able to walk. A few months since, while sitting in her chair, her speech suddenly became thick, and she lost power in both arms, the paralysis of her legs, which had improved somewhat, at the same time becoming worse.

At present she is unable to stand; she can flex and extend her legs in a feeble manner while sitting or lying down, but has no control over the movements of her feet. Her legs are lean, but not atrophied. Her arms have nearly regained their usual power. She has no loss or perversion of sensation, although she says that at one time her limbs were completely anesthetic. No pain or hyperesthesia is present. Bladder and bowels are not paralyzed. Toe-jerk, ankle clonus, front tap, with exaggerated knee-jerks and muscle-jerks, are all present. In short,

the paralysis and other phenomena in the lower limbs are such as we would expect from a transverse lesion of the dorsal cord. As results of her last attack, lips and tongue are paretic, she has slight palatal paralysis, and is unable to phonate well. She also, apparently, has some exophthalmus, which she believes has been present several years.

The best explanation of this case would seem to be that by infection, or in some unknown way, an attack of myelitis was set up during or after labor, this spending its chief force upon the dorsal cord, although at first, as in other cases, the whole or a large portion of the cord may have been involved in the inflammation. Her recent attack was probably pathologically of a similar character—a central bulbar myelitis. The alcoholic history is of interest, as chronic alcoholism, like syphilis or tuberculosis, would predispose a puerperal woman to such an attack. Neuritis, either diffused or multiple, was not present. The blindness of one eye and the protrusion of the eyeballs may be explained on the theory of the occurrence of foci of inflammation in some of the centres at the base of the brain, or in the ganglia of the sympathetic.

Handford, in the paper cited, reports a third case of which he expresses doubt as to its neuritic character, or at least of its being one of simple neuritis. Its onset after confinement, however, was clear, and the case has some symptoms pointing toward neuritis. The following are Handford's notes:

"In this case the diagnosis is difficult, but it lies between tabes dorsalis, sclerosis with patches in the crura and in the lumbar enlargement of the cord, and multiple neuritis. There certainly is ataxy; but against the affection being tabes are the facts that she has never suffered from lightning pains or gastric crises; the pupils are dilated, there is no atrophy of the optic disc; the arms were affected as early and as severely as the legs; there is distinct loss of power, and now distinct muscular wasting. There was no evidence of syphilis, and her children are very healthy looking. E. S., aged 31 years; married six years, three children. She suckled the last a year and a half. Difficulty in walking and a weakness in the arms came on after her confinement, two years ago. In the house she used to have to assist herself by the furniture, and in the street walk along by the wall. On admission, in July, 1888, she could not stand, and could only feed herself with one hand, with a spoon. The legs were very feeble, and occasionally jumped and became drawn up without the patient's knowledge. The knee-jerks were totally absent, as were also all the superficial reflexes. Cutaneous sensibility was much diminished in the arms and legs. There was double ptosis and divergent strabismus, with widely dilated pupils, moving to neither light nor accommodation—a complete paralysis of both nerves. Sight was good in each eye, and the discs were

normal. There was incoördination and loss of muscular sense. She soon went home, and I have been able to keep her under observation up to March, 1891. The duration of the illness is, therefore, five years. There is no appreciable alteration, except that the voluntary movements of the arms are more irregular, and the left is much weaker than the right. There is no rigidity of the legs. The thighs are well nourished, but there is considerable wasting of the muscles below the knee on the left side. She cannot stand, but spends her time entirely in bed, eats, sleeps well, and is free from pain."

A close reading of this case would seem to indicate that in all probability the patient suffered from a form of diffused myelitis, the inflammation attacking, beside the cord proper, the basal nuclei. The active sensory symptoms of neuritis were absent in the case, although diminished sensibility was present.

To hysterical and reflex paralyses I shall only refer, as the chief purpose of the paper is to direct attention to the organic forms of post-puerperal affections, peripheral and spinal. Any form of hysterical paralysis may occur, in one predisposed, under any sufficient exciting cause, and certainly pregnancy or the puerperium is sufficient for the production of any functional nervous affection. A few cases with hemi-anesthesia, evidently hysterical, have been put on record as occurring during gestation or in the puerperal period, as, for instance, by Churchill,[1] who is quoted by Lloyd.

The reflex theory has been used for these as for other cases to escape difficulties which the industry or the ability of the physician has not been able to overcome. Instead of paralysis being due to some vague form of reflex action dependent upon an abnormal excitement exhausting the spinal centres, it is more reasonable to assume that, at least, in not a few of these cases, actual transmission of the inflammatory process by ascent to the cord occurs; or that a septic or infectious agent in the blood poisons the centres and nerve tracts, and gives rise to a true toxic palsy; although in extreme instances a puerperal excitement may be so sudden and so great as to overwhelm the centres to which it is transmitted, and to produce by exhaustion temporary paralysis. Cazeaux and Tarnier quote Jaccoud in explanation of the reflex origin of the paralysis of gestation and childbed as of other paralyses. Many such paralyses are said to be occasioned by exhaustion of the nerve centres. A long-continued excitement transmitted to the spinal cord by the uterine nerves, exhausts the excitability of the spinal centres, and these exhausted centres are no longer able to transmit the motor impulses to the brain, hence paralysis results.

As many of the cases are of septic or infectious origin, and as this

[1] Churchill: Dublin Quart. Journ. Med. Sci., Vol. XVII, and *op. cit.*

infection may in some instances be introduced from without, the importance of extreme cleanliness and antiseptic measures is emphasized by these as well as by other accidents and consequences of labor. Occasionally, as in times of epidemics, influences from without, and not in any way connected with the labor, may be efficient to cause a multiple neuritis or myelitis, and these cannot be guarded against, except by attention to the general health of the patient.

In treatment, as well as in diagnosis, it is of the utmost importance to consider the neuritis, intra-pelvic or extra-pelvic, which is present in these cases. When sure that neuritis is present, even if it is only of a moderate degree, but particularly when severe, the patient should be kept in bed, or, if on her feet, should be put back to bed. Rest alone will do much for these cases. Even where a persistent and perhaps permanent peroneal paralysis has been left, it is not necessary that the patient should suffer indefinitely with nerve inflammation, and the degree of improvement of the paralysis which will take place cannot be determined until the neuritis has been subdued; nor can thorough local treatment with electricity, massage, and Swedish movements be carried out while the limb is in a painful state. In cases of the second class which have been here discussed—those of neuritis with pseudo-palsy and affections of the intra-pelvic viscera—treatment of the neuritis by rest and other measures should go hand-in-hand with the gynecological and general measures. These patients will not be firm on their limbs as long as their pelvic nerves are in an inflamed condition, and as long as these inflamed nerves are nagged and worried by exudates or by enlarged and displaced organs.

By means of sand-bags between, and to each side of the legs and to the feet, the limbs may be kept in a state of quietude as nearly absolute as is possible. Hot douches, or douches of hot and cold water rapidly alternated, can be applied for a few minutes at a time, twice or three times daily. If necessary, opiates may be used, but when possible they should be avoided. Even in the absence of syphilitic history, I commonly resort to inunctions of mercury until a slight constitutional effect is produced. A good ointment is one containing a mixture of mercurial ointment and lanolin, to which a measured amount of sulphate of atropine can be added. An ounce of the ointment may be divided into thirty-two parts, so that each part will contain about $\frac{1}{160}$ to $\frac{1}{130}$ of a grain of atropine; then each of these parts of ointment can be wrapped in paraffine paper, and one to four can be used daily. A good time to use the inunction is immediately after the douches. Between the times of these applications it is desirable, if possible, to keep the limbs in a mild perspiration, which may be accomplished with strips of rubber dam, such as is used by dentists and sur-

geons; wrapping the limbs loosely with strips or layers of this fastened with tapes.

Internally, in the acute and subacute stages, salicylate of sodium, salicin or salol, in full or fair doses, will sometimes be found very efficient; and phenacetin or antipyrin can sometimes be advantageously combined with these remedies. When the affection has become more chronic, iodide of sodium or potassium, or hydriodic acid, can be added, or can be substituted for the earlier treatment.

It may be necessary to use moderate doses of tonics, such as strychnine or quinine, from the first. Weak galvanic currents can be used before the pain has entirely left, as can also massage and Swedish movements; but the active electrical and manipulative treatment is rather for the paralysis which results from the nerve-crushing and neuritis than for the neuritis itself. Appropriate gynecological treatment should be thoroughly pursued.